PICU Intubation Guideline

This Guideline is for use by Medical Staff on PICU intubating children as part of their clinical practice. It will also be used by nursing staff to help set up for intubation.

Indications
Impending respiratory failure (hypoxia/hypercapnia/exhaustion)
Decreased level of consciousness
Airway compromise

Assessment
How urgent is the intubation?
• Is the airway clear and open?
• Is the patient breathing spontaneously?
• Is/can the patient be oxygenated with bag/mask or high flow oxygen?

Proceed to immediate intubation only if the patient cannot be oxygenated without intubation.

In all other circumstances:
Perform an assessment of the airway and the patient.

Anticipate Difficult Intubation If:
• Difficulty with previous intubation (grade of larynx)
• Known clinical syndromes (eg Down’s, Pierre Robin, Hurlers etc)
• Obvious anatomic problems: jaw protrusion, mouth opening, neck extension,
• Obstructive or deforming head and neck lesions or surgery, obesity
• High risk pathology (croup, epiglottitis, foreign body, burns)
• Limited pulmonary reserve (pulmonary oedema, chronic lung disease)
• Medical anaesthetic risks (cardiac disease, arrhythmia, pulmonary hypertension, hypoxia)
• Previous anaphylaxis or idiosyncratic reaction to anaesthesia (or family history)
• Mediastinal Mass
• Full stomach: rapid sequence induction required

IF HIGH RISK DO NOT PROCEED WITHOUT PICU CONSULTANT ADVICE

Preparation

• Check Equipment (see checklist at end of guideline)

• Personnel
  - Inform Nurse in charge
  - 2 doctors with appropriate experience should be present for all intubations
    unless they are emergencies. Bleep 6111 (Anaesthetic SPR on call) and ask them to attend.
  - Delegate tasks appropriately
- Ensure all the team are familiar with the equipment you may require and that you have discussed all potential complications and anticipated action required.

**Patient**

Prepare the patient:
- Explain to patient and/or parent.
- Pre-oxygenate (as high an oxygen concentration as possible, for as long as possible).
- Apply monitoring and obtain baseline readings (ECG, Sp02, BP)
- Obtain/check existing venous access (except in patients with airway obstruction where you may need to take to theatre for an inhalational induction after discussion with PICU consultant)
- Continue to resuscitate hypovolaemic patients as appropriate and **ensure you have Adrenaline and boluses of fluid (20/ml/kg) drawn up**, if the child is cardiovascularly unstable you may require inotropes running prior to intubation. A critically ill child may become extremely unstable and may arrest on intubation.
- Aspirate NG/OG tube if present

**Induction/relaxation**

Only use drugs you are familiar with:

In the cardiovascularly stable patient use propofol (titrate to effect. Usual dose is 1-3 mg/kg).
If cardiovascularly unstable use ketamine (0.5 – 2mg/kg) or consider high dose fentanyl. Ensure somebody will palpate a pulse or observe arterial line trace (where present) throughout the intubation.

If the stomach is empty and an anticipated easy intubation use atracurium 0.5mg/kg or rocuronium (1mg/kg) as a muscle relaxant.

Otherwise perform RSI using rocuronium 1mg/kg or Suxamethonium (2mg/kg in infants and 1 mg/kg in older children) +/- atropine 20microg/kg (minimum dose 150microg)

An intubation attempt should last no longer than 30 seconds. Many of our patients will desaturate before this even if adequately preoxygenated. If you cannot intubate proceed to failed intubation guideline (see below)

The ideal ETT placement is a well secured nasal ETT. A nasal ETT can either be placed directly or switched from an oral ETT after the airway has been secured. The decision as to which of these to do depends on the stability of the situation and the experience of those involved.

**Confirm tube position by use of EtCO2 detector or capnograph**
- Auscultate to ensure ETT not down a main bronchus.
- Secure the ET tube.
- Administer a bolus of sedation (midazolam 0.1 mg/kg) if propofol has been used – propofol will have worn off before muscle relaxant does.
**After intubation**
Decide if you need to give continuous sedation and/or muscle relaxants.
Site an orogastric/nasogastric tube (NG contraindicated in coagulopathy or possible base of skull fracture)
Perform Chest X-ray to confirm position of ETT and NG/OG tubes.
Document your intubation INCLUDING Grade of laryngoscopy

A nasal ETT can either be placed directly or switched from an oral ETT after the airway has been secured. The decision as to which of these to do depends on the stability of the situation and the experience of those involved.

**CONSIDER USE A BOUGIE WHEN CHANGING ETT (the easiest airways can become difficult on PICU)**

**Equipment**

Face mask, oropharyngeal airway – appropriate sizes
Ayer’s T-piece with reservoir bag or mapleson c circuit, Self-inflating bag
Laryngoscope blades – straight and curved (ensure working and bulb fixed tight)
Magill’s forceps
Endotracheal tubes age/4+3.5 for cuffed ETT and at least one size above and below. If intubating for stridor ensure smaller tubes available. Please use a cuffed tube whenever possible (the cuff may not require inflation). Cuff pressures must be monitored.
Gum elastic bougie / introducer
Laryngeal mask (in anticipation of unanticipitaed difficult airway)
High pressure suctioning with yankaur and soft suction catheter

**Monitoring** : ECG, Pulse Oximetry, Blood Pressure, **Capnography**
Failed Intubation

Prevention

(A) Oxygenation

Initial Face Mask Ventilation
Basic Rules
- Exclude/treat anatomical airway obstruction
- Exclude/treat functional airway obstruction

(B) Tracheal Intubation

Initial Tracheal Intubation
Basic Rules
- Use laryngeal pressure or BURP
- Ensure adequate level of muscle paralysis
- Verify tracheal tube position

↓ Failed Oxygenation → Call for Help ← Failed Intubation ↓

Continue with procedure if oxygenation and ventilation adequate

Failed Oxygenation Plan A
Perform direct laryngoscopy if SpO₂
Exclude/remove foreign body
Intubate trachea

Failed Oxygenation Plan B
Insert LMA or ILMA
Insert smaller sized LMA or ILMA
Convert to larymask ventilation if LMA fails

Failed Intubation Plan A
Oxygenate, ventilate and anesthetize
Use improved or visualized intubation technique
Limit intubation to 3 attempts
Verify tracheal tube position

Failed Intubation Plan B
Oxygenate, ventilate and anesthetize
Insert LMA/ILMA and intubate through the LMA
Limit intubation to 2 attempts
Verify tracheal tube position

↓ Failed Oxygenation ↓
↓ Failed Intubation ↓

(C) Rescue

Maintain two-hand – two-person face mask ventilation with naso- or oropharyngeal airway to provide some oxygen to the patient while preparing/performing procedures below

↓ ↓ ↓

Patients all ages
Surgical Cricotomy

Patients aged > 8 years
Cannula Cricotomy

If Operator and Equipment available
Surgical Tracheostomy

If Operator and Equipment available
Rigid Bronchoscopy

↓ ↓ ↓

After Care

(Debriefing - Medical Alert System - Difficult Airway Registry)
Addendum

Grades of Laryngoscopy (Cormack and Lehane classification)
Grade I: complete glottis visible
Grade II: anterior glottis not seen
Grade III: epiglottis seen, but not glottis
Grade IV: epiglottis not seen

ETT SIZE

Age/4 +3.5, use a cuffed tube wherever possible, but ensure cuff pressure is monitored

LARYNGEAL MASK AIRWAY SIZES

<table>
<thead>
<tr>
<th>Size of LMA</th>
<th>Patient Weight (Kg)</th>
<th>Cuff Volume (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 5Kg</td>
<td>2 – 5ml</td>
</tr>
<tr>
<td>1.5</td>
<td>5 - 10 kg</td>
<td>5 – 7ml</td>
</tr>
<tr>
<td>2</td>
<td>10 – 20kg</td>
<td>7 – 10ml</td>
</tr>
<tr>
<td>2.5</td>
<td>20 – 30</td>
<td>12- 14ml</td>
</tr>
<tr>
<td>3</td>
<td>&gt; 30</td>
<td>15 – 20ml</td>
</tr>
<tr>
<td>4</td>
<td>Adult female</td>
<td>25 – 30ml</td>
</tr>
<tr>
<td>5</td>
<td>Adult Male</td>
<td>40ml</td>
</tr>
</tbody>
</table>

SURGICAL CRICOHYOIDOTOMY

CALL FOR HELP

Equipment: Scalpel - short and rounded
(no. 20 or Minitrach scalpel)
cuffed tracheal or tracheostomy tube

4-step Technique:

1. Identify cricothyroid membrane
2. Stab incision through skin and membrane
   Enlarge incision with blunt dissection
   (e.g. scalpel handle, forceps or dilator)
3. Caudal traction on cricoid cartilage with tracheal hook
4. Insert tube and inflate cuff
   Ventilate with low-pressure source
   Verify tube position and pulmonary ventilation

Notes:

1. These techniques can have serious complications - use only in life-threatening situations
2. Convert to definitive airway as soon as possible
**QUICK REFERENCE**

Assess.
Two doctors present
Check drugs, availability of resuscitation drugs.
Airway Obstruction or probable difficult intubation? Seek senior anaesthetic help
Potential cardiovascular compromise? Ketamine 0.5-2mg/kg
If CVS stable-Propofol 1-3mg/kg/thiopental 2-5mg/kg
Risk of aspiration? Rapid Sequence Induction with cricoid pressure, suxamethonium 1-2mg/kg +/- Atropine 20microgram/kg, or rocuronium 1mg/kg

**Intubate**
- **Confirm ET tube position by ETCO2**
- Consider IV bolus of sedation.
- Secure ET tube.
Fluid bolus+/- inotrope
Evaluate need for muscle relaxant and continuous sedation
- Place NG or OG tube.
- Consider nasal tube
- Check tube positions by CXR.
- Document intubation

Please see full guideline for intubation

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